

## All squared

### A new radio telescope may catalyse African science



the bag

The KAT is out of

THE idea for the world's most **powerful** radio telescope, **capable of** seeing back nearly to the origins of the universe, has been around for some time. Known as the Square Kilometre Array, or SKA—as that was originally planned to be the total collecting area of its thousands of **dish-shaped antennae**—it was **conceived** of by an international group of astronomers in the early 1990s. No construction has yet begun. Indeed, no site has yet been chosen. However, in the vast **quietness** of the Karoo, a semi-desert in South Africa, a small **prototype** is already operating and its first images are, by all accounts, **remarkable**.

The Karoo Array Telescope (KAT-7) **consists of** seven **steerable** dishes, each 12 metres across. As such, it is already the most powerful array-based telescope in Africa. It is, though, merely a test bed for MeerKAT, a device that will consist of 64 somewhat larger dishes and will be the most powerful instrument in **the southern hemisphere** as well as one of the three most sensitive in the world.

The SKA will **dwarf** these **minnows**. It will be 50-100 times more powerful than any **predecessor**, and will be able to peer back through time almost to the Big Bang itself, exploring the formation of the first stars and galaxies, the role of magnetism in the early cosmos, what exactly dark matter and dark energy are, the nature of gravity, whether intelligent life has ever existed anywhere other than on Earth, and the **validity** of such fundamental scientific concepts as Einstein's theory of relativity. The world's astronomers are, understandably, **fizzing with** excitement.

#### Astronomical sums

There is, though, the small matter of money. The SKA will cost a lot: €1.5 billion-2 billion (\$2 billion-2.75 billion), according to the **nine-country consortium** behind the project; nearer \$6 billion, according to America's National Science Foundation. On November 23rd those nine countries—Australia, Britain, Canada, France, Germany, Italy, the Netherlands, New Zealand and South Africa—and possibly China as well, are due to commit themselves to paying €90m for the initial engineering-planning phase. But it will be when the **megabuck** work on the actual telescope begins in 2016, that the crunch comes.

This is where MeerKAT—**named after a species** of mongoose found in arid areas of south-western Africa such as the Karoo—could play a crucial role. The construction of its dishes is about **to be put out** to tender, and it is expected to

be fully operational by 2016. If MeerKAT succeeds, it *might* help **persuade** sceptical governments **to cough up** for the SKA. It will also enhance South Africa's chances of hosting this much larger project.

Originally, America had been expected to participate. But it has now **cried off**, at least until 2020. The disappointment of this **withdrawal**, however, is mitigated by the **keen** interest being shown by China. The country with the world's second-biggest economy has never invested in a big global science project before.

China was one of the places originally considered as host for the telescope. But it and Argentina have since been dropped, leaving just South Africa and Australia in the race. They are said **to be neck and neck**. Both offer remote, **sparsely** populated areas with low levels of **man-made** radio interference, along with world-class teams of astronomers. Australia has more experience with radio astronomy, but South Africa has the advantage of lower costs and **ease** of access. As a developing country in which over a third of the population still live on less than \$2 a day, it might also be considered to have the greater moral claim. And it has KAT-7, and will shortly have MeerKAT.

The victor will be announced in February by the board of the **not-for-profit company** that is to be formed by the participating countries when they formally **sign up** to start paying for the project. **Regardless** of who wins, some critics say South Africa's contribution would be better spent feeding and housing the country's poor. But if South Africa did succeed, that would mean part of everybody else's **contribution** would be spent there as well—a prize worth fighting for. Moreover, the government believes projects like this help **inspire** people and encourage young South Africans to consider scientific careers. Naledi Pandor, the science and technology minister, is particularly supportive. She sees the SKA as a way to broaden the country's scientific base and **diversify** its current white, male-dominated complexion.

The bid also involves eight of South Africa's neighbours—Botswana, Ghana, Kenya, Madagascar, Mauritius, Mozambique, Namibia and Zambia—and could be the launch pad for a wider scientific **renaissance** in Africa. Australia will not give up easily, and the outcome may be that the telescope is shared, with some of the antennae in one country and the rest in the other. But even that half loaf would be a useful **boost** for South African science, and a sign that the traditional powers of the subject are willing **to share the goodies**.